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PROVISIONAL INTELLIGENCE REPORT

THE COAL CHEMICAL INDUSTRY IN THE SOUTH EUROPEAN SATELLITES

CIA/RR PR-85

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PROVISIONAL INTELLIGENCE REPORT

THE COAL CHEMICAL INDUSTRY IN THE SOUTH EUROPEAN SATELLITES

CIA/RR PR-85

(ORR Project 22.161)

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FOREWORD

This report presents an analysis of the coal chemical industry and its role in the industrial sector of the South European Satellite economies. The scope of the report is geographically limited to the industry in Albania, Bulgaria, Hungary, and Rumania.

The report discusses current production, limitations, and prospects for future development in their relation to the industrial development of these countries within the Soviet Bloc. Because there are no byproduct coking plants or tar distilleries in either Albania or Bulgaria, this report deals largely with the established plants in Hungary and Rumania.

The report avoids a detailed enumeration of the myriad of chemicals derived from the major natural components of the destructive distillation (coking) of coal; their strategic significance is minor in comparison with the large-tonnage items.

Coordination of this report outside of CIA was limited to AFOIN.

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THE COAL CHEMICAL INDUSTRY IN THE SOUTH EUROPEAN SATELLITES*

Summary

Coal chemicals,** principally derived from the carbonization of bituminous coal, are extracted from the gases released as a byproduct of the production of metallurgical and gashouse coke. This byproduct is composed of coal gas, light oil, and coal tar. Coal tar is the largest component by weight. The major peacetime uses of coal chemicals are for fertilizers, dyes, insecticides, pharmaceuticals, plastics, and industrial explosives. In a wartime economy the consumption of coal chemicals would shift largely to uses for motor and aviation fuel blends, rubber chemicals, medicinals, military explosives, and the like.

The coal chemical industries of the South European Satellites are still in the relatively early stages of development. Hungary has only three major coal chemical plants, Rumania has two, and Bulgaria and Albania have none. At some time in the future, Bulgaria may become a producer, but at present Bulgaria and Albania rely on imports for their total coal chemical requirements.

In Hungary, total 1953 production of coal tar, the byproduct component from which many of the coal chemicals are derived, is estimated at 20,650 metric tons.*** Of this total, 5,800 tons were produced by the carbonization of soft coal,**** of which Hungary has extensive reserves. The emphasis is currently on research directed toward the use of this coal as a source of metallurgical-grade coke, and toward the production of coal chemicals from the byproduct coal tar. Total 1953 production of coal chemicals in Hungary is estimated at 3,055 tons.

* The estimates and conclusions contained in this report represent the best judgment of the responsible analyst as of 1 June 1954.
** The major coal chemicals discussed in this report are benzol, toluene, xylenes, anthracene, naphthalene, phenol, and cresols.
*** Throughout this report, tonnages are given in metric tons.
**** In European terminology, both bituminous coal and anthracite coal are designated as <u>hard coal</u>, and brown coal and lignite are classified as <u>soft coal</u>.

Hungary's reserves of bituminous coking coal are very small, but developments in the utilization of the indigenous soft coal in the production of coal tar would indicate that Hungary has raw material reserves adequate to the future domestic demands for those chemicals which are derived from coal tar.

Available information on trade in coal chemicals in Hungary is limited to incomplete data on imports of coal chemicals and their derivatives. Consequently, total supply, the sum of domestic production and imports, cannot be estimated with any degree of reliability. Indications are that trade in these chemicals is virtually one-way; all reports refer to shipments into the country, and there are seldom signs of coal chemicals exported in barter. It is certain, however, that domestic requirements for the major coal chemicals and for the specialized derivatives of coal chemicals are considerably greater than the sum of domestic production and known imports.

Consumption patterns of the basic coal chemicals in Hungary are not available and cannot be inferred from the fragmentary information available. Information on toluene does indicate, however, that the plants that manufacture trinitrotoluene (TNT) depend almost entirely on imported toluene, largely from within the Bloc. Current domestic requirements for toluene by the explosives plants are currently in excess of 3,000 tons per year. There are no other reported uses for toluene in Hungary, and imports of toluene can be expected to go to the production of TNT.

The coal chemical industry of Hungary is capable of expanding considerably within the next few years. It is estimated that in 1954 Hungary will produce about 39,100 tons of coal tar and that by the end of 1956 annual coal tar production will be about 48,000 tons. These estimates do not include the probable production of the new Kazincbarcia plant, now under construction, which will produce coal tar from domestic soft coals. It is expected that this production will be a major factor in the total coal tar production of Hungary, but no quantitative estimates are possible at this time. Hungarian production of benzol is expected to reach 5,590 tons by 1956, and production of toluene and xylenes will increase in proportion to the increase in benzol.

The coal chemical industry in Hungary is vulnerable only to the extent that production facilities are concentrated in two plants, the Pecs and Sztalinvaros coking plants.

The coal chemical utilization pattern in Hungary might well be an indicator of Soviet Bloc military intentions in that a pronounced shift from the peacetime uses of coal chemicals to the wartime uses would suggest preparation for military activity.

In Rumania, total 1953 production of coal tar is estimated at 5,150 tons, and total 1953 production of coal chemicals was about 2,110 tons. The major individual chemical -- on a tonnage basis -- was benzol, of which about 1,400 tons were produced.

Reserves of bituminous coking coal in Rumania are small, and current production is barely adequate for the immediate needs of the coking industry. In the absence of imports of bituminous coal, this lack of bituminous coal reserves would be a definite limiting factor in the production of coal chemicals.

Reliable data on trade in coal chemicals in Rumania are not available. The existing information indicates clearly, however, that the country depends on imports to fill the considerable gap between requirements and domestic production. These imports come largely from other Soviet Bloc countries, and Rumania exports no coal chemicals, as far as evidence indicates.

As in Hungary, the consumption pattern for coal chemicals in Rumania cannot be determined. It can be assumed, however, that the available toluene is consumed almost entirely by the munitions industry.

Although the capability of the coal chemical industry in Rumania is limited by a shortage of reserves of bituminous coking coal, current Plans are ambitious. According to Plan, annual production of coal tar will reach nearly 25,000 tons in 1956, and annual production of benzol will reach 6,000 tons. These goals are based on the assumption that a new coking plant at Hunedoara will be in full production by that time. Assuming that the new plant fulfills expectations and that adequate supplies of coking coal can be made available by domestic production and import, the Plan goals can probably be reached.

Production of coal chemicals in Rumania is vulnerable to the same degree as is Hungarian production. Rumanian byproduct facilities are concentrated at Recita and Hunedoara.

As in Hungary, a shift in the utilization pattern of coal chemicals in Rumania from peacetime uses to wartime uses would be an indicator of military intentions.

In Albania and Bulgaria, imports are the only source of any of the basic coal chemicals and their derivatives. Available information indicates that there is no domestic production of coal chemicals in either country. Postwar industrial development in Bulgaria indicates that facilities for the production of coal chemicals may be installed, but as yet there is no announced target date. The possibility of a similar undertaking in Albania is remote.

I. History and Organization.

A. General Status.

Coal chemicals were initially obtained in quantity as incidental byproducts of the production of coke from bituminous coal. In recent years, soft coals have been established as practical sources of certain of the coal chemicals. Requirements for these chemicals increase as a nation develops a demand for a host of manufactured goods which are basic products in an industrialized and reasonably self-sufficient economy.

The coal chemical industries of Albania, Bulgaria, Hungary, and Rumania are discussed in this report. Albania has no coking plant, and Bulgaria has only one comparatively small-scale coking plant with no facilities for the recovery of byproducts. Consequently, the scope of the report is virtually limited to the coal chemical industries of Hungary and Rumania.

B. Hungary.

There appears to have been no concerted effort in Hungary to obtain domestic coal tar for the production of coal chemicals prior to World War II. Actually, there were almost no processing facilities for coal tar, and the output of coal tar found its principal use in briquetting operations.

Low-temperature coal carbonization -- coking or distillation -- which is carried on primarily for production of the coal-tar product appears to be best suited to indigenous coal resources and has been carried on to a limited extent since development of the process during the Nazi occupation. During this period also came increased utilization of domestic coal resources. Equipment for recovery of the byproducts of the high-temperature coking operations and subsequent distillation of the coal tar was installed near Pecs in 1939. During the early days of World War II, crude benzol (light oil) was processed into aircraft and vehicle fuel at this plant. 1/*

The effect of the German occupation was the expansion of processing facilities for coke and coal-tar production and, subsequently, destruction or appreciable damage. Full restoration of operations at the affected sites was reported as completed by 1948-49. Production of coal tar in 1947, a year before nationalization, was still only two-thirds of 1938 output. 2/

It is believed that processing of the coking byproducts falls within the jurisdiction of one of five Industrial Centers under a Chemical Directorate within the Ministry of Heavy Industry. 3/ The latest information (September 1953) partially confirms this supposition by indicating that the chemical industry is under the Ministry of Heavy Industry. 4/

C. Rumania.

In spite of the limited industrial development of Rumania, production of coal was insufficient to meet the power needs of domestic users. The extensive natural gas resources were not fully developed, and it had been necessary, prior to World War II, to import both coke and coal to meet fuel requirements. Only the Secul mines, near the Recita Iron and Steel Combine, produce a hard coal suitable for the production of metallurgical coke and its concomitant byproduct gas which contains the coal chemicals. 5/

The Secul mines could supply only a part of the cokeable coal required by Recita, and imports of coal to keep the coking ovens near capacity operation were necessary. These practices are presumed to have been readopted after World War II to make full use of domestic coking capacity.

* Footnote references in arabic numerals are to sources listed in Appendix E.

The only major development in the industry since the war has been the construction of the Gh. Gheorghiu-Dej Iron and Steel Combine at Hunedoara, which includes a battery of coking ovens that supply the blast furnaces.

In Rumania, the usual range of coal chemicals has been reported to be in production at the Petrila Works. 6/ This is the only indication of Rumania having an operating plant for the production of these chemicals from the brown coal deposits of the surrounding Jiu Valley, and the reliability of the report is doubtful.

Production of the commodities considered here was the responsibility of the Ministry of Metallurgy and Chemical Industries set up in 1949. 7/ It was under the immediate supervision of an Industrial Directorate for Chemicals within this Ministry. This Directorate controlled the operations of the several State Industrial Enterprises having the responsibility for production of chemicals.

Latest information indicates the formation of two separate Ministries (the Ministry of the Chemical Industry and the Ministry of the Metallurgical Industry) in November 1952. 8/ Under one Deputy Minister of the Chemical Industry were established four Production Directorates, including a General Directorate of Organic Chemistry. It is believed that this administrative organization is in immediate control of the processing and distribution of the chemicals recovered from the coking operations.

II. Technology.*

A. Coal Chemicals from Coking of Bituminous Coal.

The basis for the production of coal chemicals lies in the coal carbonization process. Since there are several grades of coal mined in Hungary and Rumania, coking methods vary with plant locations. There are two widely used methods which depend on the final temperature level attained in the coking chamber during the carbonization process. A further modification of the high-temperature method results in a third method. All of these methods are designed to yield a different major product.

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* See the chart illustrating the distribution of the principal chemicals in the byproduct fractions, following p. 6.

THE COAL CHEMICAL INDUSTRY
IN THE SOUTH EUROPEAN SATELLITES

Distribution of the Principal Coal Chemicals
in the Byproduct Fractions

- COAL
  - COKE
  - COAL GAS
    - FUEL GAS
    - GASEOUS AMMONIA
      - AMMONIUM SULFATE
  - LIGHT OIL
    - XYLENES
      - ORTHO-XYLOL
      - META-XYLOL
      - PARA-XYLOL
    - BENZOL
    - TOLUENE
  - COAL TAR
    - TAR ACIDS
      - PHENOL
      - CRESOLS
        - ORTHO-CRESOL
        - META-CRESOL
        - PARA-CRESOL
    - NAPHTHALENE
    - ANTHRACENE

Coal tar, the major product of the destructive distillation of coal, is produced by: (1) a high-temperature coking operation in which a metallurgical-grade coke is the major product, (2) a high-temperature coking operation in which fuel gas (illuminating) is the major product, and (3) a low-temperature operation in which coal tar is the major product.

In the high-temperature coking operation the final temperature ranges above 900° Centigrade; in the low-temperature process the operation is continued until a final temperature no higher than 700° Centigrade is reached. As there is variability in each of the three basic methods outlined, the components of the byproduct gases vary widely in relative amounts and purity. The major product, by weight, is always some form of coke -- metallurgical, gas, or semi-coke -- and a byproduct gas consisting of several volatile fractions (at oven temperatures) -- coal gas, light oil, and coal tar. The coal gas contains a fuel gas and ammonia (only from bituminous coal carbonization), which, in turn, is converted to ammonium sulfate.

The light oil fraction contains almost all of the benzol, toluene, and xylenes existing in the byproduct gas as it comes from the bituminous coking oven. The coal-tar fraction has components ranging from the heavy residues of industrial pitches and road tar to naphthalene and the tar acids, the immediate source of phenol and the cresols. 9/ Generally the composition of the coal tar fraction alone will vary significantly with differences in variables such as coal type, oven design, and temperature range. The fundamental effect of the low-temperature method is a higher yield of coal tar product which is even more complicated in its chemical composition than the coal tar obtained by use of the high-temperature method. This is caused by less complete breakdown of the volatile components (byproduct fractions) at the lower carbonization temperature.

Tables 1* and 2** indicate the estimated yields of major coal chemicals from bituminous coal in Hungary and Rumania, respectively.

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* Table 1 follows on p. 8.
** Table 2 follows on p. 9.

Table 1

Estimated Yields of the Major Coal Chemicals from Bituminous Coal in Hungary

Metric Tons

Product	Yield per Thousand Metric Tons of Metallurgical Coke a/	Yield per Thousand Metric Tons of Gashouse Coke b/
Crude Coal Tar		
Pecs-Komlo Mines	49.0	52.0
Imported Silesian Coal	38.0	Unknown
Light Oil (Crude Benzol)	17.8	8.5
Refined Benzol	10.3 c/	Negligible
Toluene	1.5 c/	Negligible
Xylenes	0.3 c/	Negligible
Phenol	0.23 d/	0.45 e/
Cresol	0.94 d/	Unknown
Naphthalene	3.35 d/	1.77 e/
Crude Anthracene	1.03 d/	Negligible
Ammonia Liquor	Unknown	None

a. Applicable to the coking plants at Pecs and Sztalinvaros.
b. Applicable to the coking plant at the Budapest Gasworks.
c. Reported yields from fractionation of light oil from Czechoslovak coal. 10/
d. Experimental yields from the distillation of Komlo coal tar as reported.
e. Reported yields from German gas-coking practices. 11/

Table 2

Estimated Yields of the Major Coal Chemicals
from Bituminous Coal in Rumania

Metric Tons

Product	Yield per Thousand Metric Tons of Coke at Recita a/	Yield per Thousand Metric Tons of Coke at Hunedoara b/
Crude Coal Tar	38.0	43.0
Refined Benzol	10.3	8.15
Toluene	1.5	1.98
Xylenes	0.3	0.71
Naphthalene	3.0	1.8
Phenol	0.3	0.38
Cresol	0.46	0.6
Ammonia Liquor (Ammonia Content)	3.1	3.4
Ammonium Sulfate	12.2	13.15

a. These yields are based largely on German and Czechoslovak practices. The actual recovery will vary from year to year depending on relative demand. These factors are intended to indicate an average of a range of yields which will most likely be experienced at an installation in the period of just one year.
b. It is thought that Soviet equipment and technology are being employed, and the use of Soviet yield factors seems justified in making the estimates. 12/

B. Coal Chemicals from the Coking of Soft Coals.

Hungary is known to have experimented with, and now claims to have perfected, a process for the coking of soft coal of a lignite grade (similar to that used with limited success by the Germans) such as is found in their Borsod coal basin. 13/ There is no information about the quality of the light oil, if any, which will come from carbonization of this grade of coal. Hungarian researchers have reported on the results of a detailed analysis of the coal tar from the coking plant at Borsod. It is stated to be of a high acidic content (probably rich in phenol and cresols) and of a relatively low pitch yield. It seems to form an intermediate between the tar of low-temperature distillation and that of coal coking. 14/

C. Coal Chemicals from Petroleum Catalytic Hydroforming.

Commercial-scale synthesis of benzol, toluene, and xylenes from petroleum fractions is a proved industrial process. One fraction of raw petroleum containing cyclohexanes is the starting raw material for their synthesis. The cyclohexanes are transformed into the 3 chemicals found naturally in the light oil fraction collected during the process of coal carbonization. The particular one of these 3 chemicals produced is a function of the hyroformer design and the catalyst used.*

III. Supplies.

A. Production.

1. Coal Chemicals from Bituminous Coal.

Because the bulk of coal-tar output (as the major fraction of byproduct gas) is produced in the manufacture of coke, there is an obvious correlation between the coke production and coal chemical production at a coking plant. National production estimates for coal chemicals are difficult to correlate directly with national coke production estimates. This is primarily the result of the variability in the operations at the several plants located in each of these countries. In Hungary, this contention is well borne out. Each of the major methods of carbonization discussed in Section II, above, is in operation at one major installation in Hungary. In Rumania, there are only two major plants believed operative, and both are producing metallurgical coke. Thus a correlation between coal chemical production and coke production is satisfactory only in the case of Rumania.

* This process is being used by several oil companies in the US and is a conceivable source of these chemicals in Rumania, in view of their large natural resources of major raw material.

A second principal consideration in estimating coal chemical production is the fact that the future of the byproduct coking industry is ultimately tied up with the steel industry. The activity of the latter affects the former directly. Expansions in iron and steel capacity will be the principal factor in deciding upon new facilities for metallurgical coke production.

Presuming that facilities for byproduct recovery are installed at any future coking plant, chemical production will be a function of coke production. Within the broader limitations just outlined, emphasis on the recovery of one byproduct fraction or commodity over another will fluctuate with varying requirements for the chemicals contained in the byproduct gases.

a. Hungary.

As a result of World War II and the Nazi occupation, the Hungarian coking facilities for the production of coal tar were first expanded and then destroyed or damaged. Full restoration of these damaged installations was not reported as completed until 1948-49. Coal-tar output was reported as 8,000 tons in 1947, as compared with a production of 12,000 tons in 1938. 15/ This was the state of the industry at the time of nationalization in 1948.

Notwithstanding the limited resources of raw coal, the goals for coal chemical production announced as part of the current Five Year Plan (1950-54) indicate a concerted drive to attain self-sufficiency in this group of chemicals. In particular, the Plan calls for a fourfold increase in brown-coal-tar output during its course. It also aspires to a sixfold expansion in coal tar (apparently from all sources) during the same period. 16/

Plant studies of the brown-coal-tar plants indicate a twofold increase (from 3,000 tons to 5,900 tons) of coal-tar output from brown coal as a more reasonable estimate. The markedly lower-than-announced increase can be accounted for by the uncertain output of Kazincbarcika. It will not become operative during the Plan period, and it is certain that its production was originally anticipated to begin during the term of the Plan.

Plant studies of all coking plants and tar distilleries indicate a twofold expansion (from 18,200 tons to 39,100 tons) during the Plan period. Here also the actual increase estimated is only one-third of what was planned. The difference in the estimates is the result of over-optimistic predictions by the Hungarians at the beginning of the Plan period as to when Kazincbarcika and Sztalinvaros would begin to make substantial contributions to national production of coal chemicals.

During this same period, benzol will range from a negligible quantity to approximately 4,310 tons.* This increase is the result of the beginning of production at the coking plant at Sztalinvaros early in 1954.

b. Rumania.

Production of benzol, limited to the Recita plant prior to 1953, may have reached an annual rate of 875 tons. With the advent of production at the coking plant at Hunedoara, output of benzol should have reached 1,400 tons in 1953. If the planned capacity of Hunedoara is realized, a further rise to 6,000 tons is anticipated for the 2 plants by the end of 1956. Production of coal tar at Recita may have reached 3,250 tons in 1952. The Hunedoara plant will cause an estimated initial rise in production of coal tar to almost 25,000 tons in 1956.**

The coal tar produced at the cokeries other than Recita could have been processed into coal chemicals, but this was not done prior to World War II. It has been established that this production of tar formerly went into the manufacture of briquettes.

There have been reports of production of phthalic anhydride (derived from naphthalene) and phenol at several refineries of the Mutential Enterprise, whose holdings include all former foreign-owned refineries, representing 60 percent of production of domestic oil. 17/ The production of phenol at the "Metallurgical Factory for Nonferrous Metals" in Baia Mare was reported as beginning in early 1952. The output is unknown, but the same source claims that shipments of 4 to 5 tons are supplied to a pharmaceutical factory but does not indicate the frequency of delivery. 18/

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* Table 6, Appendix A, indicates production estimates for all the major chemicals from bituminous coal for selected postwar years which are most indicative of the changing domestic output of these chemicals.

** Table 7, Appendix A, gives production estimates for the major coal chemicals for selected postwar years.

The production of benzol, toluene, and xylenes from petroleum has been discussed in Section II. The Rumanians are not believed to have exploited this potentially major source up to the present, and they probably will not in the foreseeable future. Research designed to utilize this source has been reported by an on-the-spot observer. This research was prompted by the army for supply of toluene for production of TNT, but it proved abortive, as ensuing complications which arose during this period caused the project to be dropped. It is therefore impossible to predict when the Rumanians will employ "catalytic hydroforming" on a commercial scale for the production of highly desired nitration-grade toluene. 19/ Benzol and toluene have been recovered in small quantities directly from the refining of petroleum. 20/

The basic limitation of the Rumanian industry in using to capacity already existing facilities is inadequate domestic supplies of cokeable coal which will yield a product satisfactory for blast-furnace operations. Logically, the production of coal chemicals at the metallurgical plants will be affected to the same degree that there is any curtailment in production of coke.

In summation, it can be said that the industry has supplemented large-scale imports in meeting domestic requirements for these coal chemicals in past years, but it has made only a minor contribution to the total production of the Soviet Bloc -- certainly less than 1 percent.

2. Coal Chemicals from Soft Coal.

a. Hungary.

Production of coal tar from the indigenous brown coal deposits was limited to the small plants at Csepel Island, Diosgyor, and Ozd. Since the war, it is certain that the Budapest Gasworks has begun to use brown coal in addition to bituminous coal, but the extent of this use is unknown and therefore coal tar produced from brown coal is as yet undetermined. Dorog processes the lighter fraction of the tar produced at the foundries, and at the present time, all domestic production of tar acids (phenol and cresols) from lignite is attributed to this plant. (See Table 8, Appendix A.)

When the Kazincbarcika combine becomes operative, coal-tar production from soft coals will certainly undergo a manifold increase. The exact magnitude of this increase cannot be determined; the date of beginning production is unknown, and the end use of the tar to be produced has not been determined.

b. Rumania.

No domestic production of coal tar from soft coal is yet credited to Rumania. There has been one unconfirmed report of such production at the Petrila plant, but this is inconsistent with knowledge of the present operation at the plant.

Table 3* gives a summary of estimates of production of coal chemicals from coal carbonization in the South European Satellites for selected years 1948-56.

B. Trade.

There is scant information concerning South European Satellite trade in coal chemicals and their derivatives. This information tends to indicate that trade in these commodities is largely one way. All the reported shipments of these products were into the Balkan countries, and there was no return export of these chemicals in barter. Table 4** gives the available data on imports of coal chemicals and derivatives into Hungary, 1950-52.

Table 4 indicates the variety of products which are coal-tar derivatives and are in demand by Hungary in tonnage quantities.

Table 5*** gives the available data on imports of coal-tar derivatives into Albania and Bulgaria, 1951-52. These data partially confirm the belief that these countries have neither the facilities for production of the coal chemicals nor those for processing any of the basic coal-tar components into specialized products.

Import of specialized coal chemical derivatives is, apparently, important to Hungary. In Rumania, a situation analogous to that in Hungary is believed to exist. In Albania and Bulgaria, imports are the sole source of any of these coal-tar derivatives.

* Table 3 follows on p. 15.
** Table 4 follows on p. 16.
*** Table 5 follows on p. 16.

[redacted]

Table 3

Summary of Estimates of Production of Coal Chemicals from Coal Carbonization in the South European Satellites a/ Selected Years, 1948-56

Metric Tons

Product	1948	1951	1952	1953	1954	1955	1956
Metallurgical Coke	112,000	137,000	147,000	197,000	735,000	985,000	1,200,000
Gashouse Coke b/	150,000	215,000	215,000	215,000	245,000	245,000	245,000
Crude Coal Tar c/	14,800	21,750	23,800	25,800	49,200	63,100	72,550
Refined Benzol d/	520	775	875	1,400	6,210	8,490	11,490
Toluene	80	110	125	200	1,115	1,560	1,990
Xylenes	Negligible	Negligible	Negligible	Negligible	320	455	600
Light Oil (Crude Benzol) d/ e/	1,290	1,830	1,830	2,080	2,080	2,080	2,080
Naphthalene d/	620	850	855	1,040	2,410	3,125	3,510
Tar Acids f/	60	160	165	165	170	170	170
Phenol d/	110	160	165	180	370	420	500
Cresols d/	115	240	255	275	525	760	950
Anthracene d/	65	75	75	75	425	550	600
Ammonium Sulfate	610	915	1,040	1,650	9,900	13,550	16,450

a. Actual coke and byproducts output occurs only in Hungary and Rumania; see Appendix A, Tables 7, 8, and 9 for breakdown by countries.
b. Only the production at the Budapest municipal gasworks is accounted for here.
c. This production is from carbonizing of coals of all grades in both countries.
d. Considered as an end product in estimates of production of coal chemicals.
e. Use in this form is thought to exist only at the Pecs plant in Hungary.
f. A fraction of coal tar which is processed at the Dorog Distillery in Hungary.

[redacted]

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[redacted]

Table 4

Known Imports of Coal Chemicals and Derivatives into Hungary
1950-52

Metric Tons

Chemical	Origin	1950	1951	1952
Toluene	East Germany		108 21/	1,040 22/
	Unknown			90 23/
DDT	East Germany			213 24/
Xylenes	East Germany		20 25/	20 26/
Phenol	Switzerland		15 27/	
	West Germany			30 28/
Cresol, Ortho	East Germany		180 29/	33 30/
TCP	East Germany			150 31/
Beta Naphthol	East Germany		65 32/	
Phthalic Anhydride	Italy			36 33/
Coal-Tar Derivatives	Switzerland	85 34/		
Coal-Tar Dyes	Switzerland	152 35/		
Aniline Dyes	East Germany			34 36/
Xylidine	Sweden			5 37/
"Vulkazits"	East Germany			33 38/

Table 5

Known Imports of Coal-Tar Derivatives into Albania and Bulgaria
1951-52

Metric Tons

Product	Origin	1951	1952	Destination
Benzene Hexachloride	East Germany	40 39/	300 40/	Bulgaria
DDT (100-Percent Basis)	East Germany		78 41/	Albania
	East Germany	58 42/	173 43/	Bulgaria
TCP	East Germany		1 44/	Bulgaria

[redacted]

In view of the sketchy information available on the import of coal chemicals and their important derivatives, total supplies -- which are the sum of production and imports -- cannot be estimated with any reliability. It is certain, however, that the domestic requirements of these countries exceed, to an appreciable degree, the sum of estimated production and established imports.

IV. Consumption.

A. Introduction.

The paucity of information on the particular consumers of coal chemical supplies precludes the construction of consumption patterns. These patterns customarily indicate the percentage of supply of each major coal chemical going into a specific commercially useful derivative.

The major chemicals separated from the various components of the byproduct fractions are discussed in the paragraphs below in as much detail as is known about their general uses. Indicated in particular is any information about distinct uses within the South European Satellites. The byproduct fractions which yield coal chemicals are the coal gas, light oil, and coal tar.

B. Coal Chemicals Derived from Coal Gas.

Ammonium sulfate is employed almost exclusively as an agricultural fertilizer -- certainly in the Balkan countries where the need for fertilizers far exceeds the supply.

C. Coal Chemicals Derived Principally from Light Oil.

1. Refined Benzol.

Refined benzol is widely used in Europe as a blend in motor fuel, as a solvent, and as a starting material for dyes, insecticides, pharmaceuticals, plastics, and synthetic rubber.

a. Hungary.

Benzol is required in the synthesis of nitrobenzene, which has been reported in manufacture at the Papkeszi explosives plant (quantity undetermined) and the Plantokemia plant in Budapest, where capacity production can reach 165 tons a year. 45/ Nitrobenzol, in turn, is used largely in the manufacture of aniline. Aniline is the basic compound for the production of dyes at the Hungarian Chemical Works in Budapest. 46/ Aniline is also a starting point for the synthesis of sulfa drugs, reported to be first produced in Hungary at the Chinoin Pharmaceutical Factory, north of Budapest. Aniline may also be used for synthesized dimethylaniline, a starting material for the high explosive, "Tetryl." 47/ Benzol is also basic to the production of styrene, used in making plastics and synthetic rubber. There is a report of the planned beginning of DDT production, which also requires benzene derivatives. 48/

b. Rumania.

Benzol requirements of Rumania are presumed to be conventional in the absence of specific reports of uses. In March of 1954, the Rumanian radio announced, "A big factory is to be commissioned before long for the production of DDT... ." 49/ This is the only specific report of new uses for benzene in Rumania.

c. Albania and Bulgaria.

It is likely that Albania imports benzol-derived end products. Bulgaria probably has very limited uses for the raw chemical, but the extent or nature of these uses is not known specifically.

2. Toluene.

Toluene is a major raw material for conventional military explosives, is a component of industrial explosives, is used as a blend in aviation gasoline, is an industrial solvent, and is a major component (solvent) of lacquer.

a. Hungary.

Toluene is one of the major components of the military explosive, TNT. There are consumption requirements for toluene at three plants known to be producing TNT after World War II. The Nitrokenia plant at Fuzfo requires the bulk of Hungary's available toluene. 50/ The plant capacity for use of toluene was as high as 5,000 tons during the war and is estimated at about 3,000 tons at the present time. Reference to the production estimates indicates that there is no significant domestic supply of toluene; the TNT plants depend almost exclusively on imported toluene. Comparatively small-scale production of TNT has been reported at the nearby explosives plants in Papkeszi and Peremarton. 51/ Current domestic requirements for toluene, based on these plants, are currently in excess of 3,000 tons per year. There are no other uses reported for toluene in Hungary, and if they exist they would constitute only a minor fraction of the total consumption.

b. Rumania.

Of the known explosives manufacturing plants in Rumania, only Nitramonia at Fagaras is known to have had facilities for production of TNT during World War II. In the absence of contrary information, it is assumed that some production is carried on there, or possibly at the new postwar explosives plant at Ucea-de-Sus. Thus toluene requirements in the country are presently unknown, but it is a fair assumption that these plants consume some significant quantities of toluene and that domestic production (estimated at 1,150 tons by 1956) cannot meet even the very limited consumption.

c. Albania and Bulgaria.

Neither Albania nor Bulgaria is known to have any facilities for the nitration of toluene into TNT. Only recently did Bulgaria begin domestic production of nitric acid. There is no indication of future production of toluene in either country.

3. Xylene.

Xylene is a mixture of several closely related organic compounds which find various uses as protective coatings, solvents, gasoline blends, and as starting points for the synthesis of certain resins, plasticizers, and dyestuffs. There is no available information about the disposition of this chemical in any of the Balkan countries. In East Germany xylene is used mainly in protective coatings, and the same is probably true in the South European Satellites.

D. Coal Chemicals Derived Principally from Coal Tar.

1. Phenol.

Phenol, which is derived naturally from coal tar, is in such great demand that in many industrial nations it is produced synthetically in greater quantities than are obtained by coal carbonization.

It is expected that Hungary will begin production of synthetic phenol as phenol-based resins are used more extensively. Phenolformaldehyde resins (Bakelite-type) are produced in unknown amounts at the Klotild factory in Budapest. 52/ Crude phenol (phenol and cresol mixture) is shipped from the Dorog distillery to this plant. 53/

Phenol is essential for the production of the explosive, picric acid, which has largely been supplanted by TNT. In the event of a toluene shortage, the production of picric acid from phenol can be adopted as an emergency measure. Production of picric acid in Hungary is not known or believed to exist at present. Phenol is used in the production of nylon-type fibers such as Perlon. This fiber is reported in production, at an unspecified location, for the manufacture of parachutes for the Eastern Satellites. 54/ There has been an unconfirmed indication of the production of salicylic acid from phenol. This intermediary finds its principal use in medicinals such as aspirin.

2. Cresols.

Cresols are a mixture of three closely related organic compounds which are used primarily in plastics and plasticizers. Other important uses of cresol are in ore-flotation chemicals, disinfectants, medicinals, and dyes.

a. Hungary.

Cresol can be processed with some difficulty to yield one of its components, meta-cresol. This refined product is a component of the explosive Ecrasite, which has been reported in production at Peremarton. 55/ Cresol is also essential to the manufacture of tricresylphosphate (TCP), which is used as a plasticizer, but domestic production has not yet been reported. Hungary has solicited offers of sale of TCP from outside the Soviet Bloc, indicating that there is some domestic consumption of the compound. 56/

b. Rumania, Albania, and Bulgaria.

There are no reports of specific uses of cresols in Rumania, Albania, or Bulgaria.

3. Naphthalene.

Phthalic anhydride is synthesized from this coal-tar component. Phthalic anhydride is used principally in resins and plasticizers. The ester, dibutylphthalate, is used as a plasticizer in smokeless powder. The synthesis of phthalic anhydride is accomplished with considerable technical difficulty, and there is, as yet, no indication of any of the South European Satellites having a commercial process in operation. Beta naphthol is another product derived from naphthalene. It is used principally in dyes and rubber and especially in the synthesis of the important rubber chemical, phenylbetanaphthylamine (PBNA), which is used as an antioxidant. Beta naphthol is not reported as being currently produced in any of the South European Satellites.

A Hungarian purchasing agent sought to buy a quantity of phthalic anhydride outside the Soviet Bloc (in Italy) in 1951. 57/ This indicates that at least a limited need for the chemical existed at that time.

4. Anthracene.

Anthracene is used for the manufacture of dye intermediates. There are no specific reports on the uses of anthracene within the South European Satellites. Any production is therefore presumed to go into the conventional uses outline.

E. Prospects for Future Consumption.

The trend toward greater use of synthetic dyes was a great boon to the producers of coal tar. This trend, first developed in the US and in Western European nations such as Germany, is known to have reached Rumania, as at least one synthetic dye factory has been verified as existing and operative. 58/

As the technology of the comparatively backward chemical industries of the South European Satellites advances, they will make a greater demand for the components of the byproduct fraction gases on domestic producers. This will emphasize further the need for new and improved facilities for recovery and refining of these chemicals to minimize a growing dependence on imports for supply. Uses of these products in the South European Satellites will first expand to include those fundamental uses in the more industrially developed Western countries. Beyond this point, predictions are baseless.

V. Capabilities, Vulnerabilities, and Intentions.

A. Capabilities.

1. Hungary.

The capacity of the coal-tar industry in Hungary at the present time (1954) falls far short of meeting the minimum requirements for the basic products of coal tar processing. Hungary has the most extensive facilities of all the Balkan countries for the synthesis of the specialized organic chemicals from the basic chemicals. With large resources of soft coal, generally rich in coal tar, Hungary has a great potential source of the chemicals found principally in tar acid, a component of coal tar, if they master the major technological problems confronting them. This industry makes only an incidental contribution to Soviet Bloc production.

2. Rumania.

The capacity of the Rumanian coal-tar industry is acutely inadequate to supply domestic requirements for its products up to the present time. The country has very limited facilities for the production of the special organic chemicals which can be derived from the basic coal tar. With extensive petroleum and natural gas resources, a great potential field is available for the synthesis of the chemicals now naturally derived from coal coking operations, if the involved technology and equipment can be acquired. Rumania's contribution to the Soviet Bloc production of these chemicals borders on insignificance. When the new facilities at Hunedoara are in full production, however, the country will have acquired a domestic source of supply which substantially meets requirements for the basic coal chemicals.

3. Albania and Bulgaria.

Since there are no coking plants engaged in the recovery and refining of byproduct gases in either Albania or Bulgaria, these countries have no capabilities for domestic production.

B. Vulnerabilities.

1. General.

Because the coal-tar industry, through its relation to the production of metallurgical coke, is closely linked to the iron and steel industry, the two have limitations in common. Limited coal production hampers expansion of coal chemical production as well as expansion of steel capacity. Lagging production of coal will make difficult the maintenance of production of coke and coal-tar chemicals at usual rates. The peculiarly aggravating feature of coal shortages is that coking ovens must operate at designed capacity, and to reduce output means to shut down the ovens entirely. This is damaging to the ovens, and it would not be logical to resume production until stocks on hand are adequate to keep the ovens operative.

Damage to the byproduct recovery equipment at a coking plant will impede the recovery of the byproduct gases while the ovens are functioning. The preferred method of operation is a steady input flow to the processing equipment. Thus, maintenance of recovery facilities and adequate storage space are essential to utilize the production of byproduct gas.

2. Hungary.

The present and anticipated production of chemicals recovered from the processing of coal tar is centered at all five plants in Hungary. Only two plants, Pecs and Sztalinvaros, are possible producers of the light oil (a major byproduct gas function) which contains benzol, toluene, and xylenes. Thus, domestic supply of these three chemicals stems from these plants, and interruptions or damage to the recovery or processing equipment will affect their output directly.

The other three plants, at Budapest, Dorog, and -- eventually -- Kazincbarcika, produce chemicals from the processing of coal tar almost exclusively. The processing and refining equipment must be maintained and protected against damage to avoid the cutting off of production of refined coal chemicals from crude coal tar.

As the raw materials are generally from domestic sources, the requirement for imports of cokeable coals constitutes only a limited weakness. The new plants are being designed to rely almost exclusively on domestic production of coal. Limited availability of chemical equipment for organic chemical synthesis will hamper indefinitely the independent domestic supply of coal chemicals.

3. Rumania.

The output of coal tar in Rumania is confined essentially to the metallurgical coking plants at Recita and Hunedoara. The recovery facilities at each plant are subject to the same hazards as are those at any coking plant. Rumania, however, has the least flexibility in production, for it has the smallest number of plants of any of the European Satellites except Bulgaria. The construction of coke batteries and byproduct recovery facilities is a major project. Replacement equipment would have to be imported to maintain established plants. Production of coal tar at the small cokeries is insignificant, and they are not equipped for processing of the coal tar.

Production of explosives is dependent on coal chemicals such as toluene and benzol, which, in turn, rely on the two plants mentioned for any and all domestic supply. Any deficiencies must be made up by imports, or production of these explosives will be limited accordingly.

4. Albania and Bulgaria.

All requirements for Albania and Bulgaria must be met by imports, ostensibly from within the Soviet Bloc. There is no known domestic production. The hazard of relying exclusively on exports for essential products is manifest, even in the light of the comparatively minor requirements of these countries.

C. Intentions.

1. Hungary.

Since World War II, Hungary has placed great emphasis on the development of the coal chemical industry based on indigenous resources. This is probably indicative of industrial planning toward expansion of industry compatible with available natural resources.

The trend in the coal chemical and coking industry clearly demonstrates a drive toward relative self-sufficiency in this industrial sector. It may well be a single illustration of the broad aims of the state planners to minimize their reliance on external sources for essential commodities.

2. Rumania.

Since World War II, Rumania has likewise placed considerable stress on the expansion of its coking industry to supply its metallurgical plants. Full utilization of domestic coal sources may exemplify a general tendency of the planners to minimize their present extensive dependence on imports for a host of commodities vital to any country in the process of industrialization after long being a basically agrarian economy.

3. Albania and Bulgaria.

There is no coal chemical industry existing in either Albania or Bulgaria.

APPENDIX A

ESTIMATES OF PRODUCTION OF CHEMICALS FOR INDIVIDUAL COUNTRIES

Table 6* gives estimates of production of chemicals from the coking of bituminous coal in Hungary for selected years, 1948-56. Table 7** gives estimates of production of chemicals from the coking of soft coals in Hungary for selected years, 1949-56. Table 8*** gives estimates of production of chemicals from the coking of bituminous coal in Rumania for selected years, 1948-56. (See Appendix B for the source of these national estimates.)

* Table 6 follows on p. 28.
** Table 7 follows on p. 29.
*** Table 8 follows on p. 30.

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Table 6

Estimates of Production of Chemicals from Coking of Bituminous Coal
in Hungary a/
Selected Years, 1948-56

Metric Tons

Product	1948	1950	1951	1952	1953	1954	1955	1956
Metallurgical Coke b/	62,000	62,000	62,000	62,000	62,000	500,000	600,000	625,000
Gashouse Coke c/	150,000	200,000	215,000	215,000	215,000	245,000	245,000	245,000
Crude Coal Tar	10,800	13,400	14,850	14,850	14,850	33,200	40,600	41,800
Refined Benzol d/	Negligible	Negligible	Negligible	Negligible	Negligible	4,310	5,340	5,590
Toluene d/	Negligible	Negligible	Negligible	Negligible	Negligible	650	800	840
Xylenes d/	Negligible	Negligible	Negligible	Negligible	Negligible	150	180	190
Light Oil (Crude Benzol) d/	1,290	1,700	1,830	1,830	1,830	2,080	2,080	2,080
Naphthalene d/	470	560	630	630	630	1,985	2,425	2,475
Phenol d/	85	105	110	110	110	250	250	255
Cresols d/	50	55	70	70	70	335	380	455
Anthracene	65	65	75	75	75	425	550	600
Ammonium Sulfate e/	None	None	None	None	None	6,800	8,500	8,900

a. This includes the bituminous coal imported from other Satellites as well as the coal of the Pecs-Komlo mining district.
b. This production is confined to the Pecs and Stalinvaros works only, since projected production at Kazincbarcika will be from brown coal and lignite of the Borsod region and may not be suitable for blast furnace use.
c. Only the production of the Budapest Gasworks is estimated here because of the dearth of information concerning other municipal gas plants and the belief they do not have recovery facilities.
d. Considered as an end product in estimates of production of coal chemicals.
e. Recovery of the ammonia in the byproduct gas in the form of this salt has been established only for the new coking plant at Sztalinvaros.

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Table 7

Estimates of Production of Chemicals from Coking of Soft Coals in Hungary a/
Selected Years, 1949-56

Metric Tons

Product	1948	1949	1950	1951	1952	1953	1954	1955	1956
Crude Tar	2,100	3,000	4,800	5,500	5,700	5,800	5,900	6,000	6,000
Tar Acids b/	60	85	140	160	165	165	170	170	170
Phenol b/	10	14	20	25	30	30	30	30	30
Ortho-Cresol b/	12	17	25	30	35	35	35	35	35
Meta-Cresols and Para-Cresols b/	38	54	90	105	110	110	115	115	115

a. All the tars produced from the soft coal ovens at Csepel, Disogyor, and Ozd are processed at Dorog.
b. Considered as an end product in estimates of production of coal chemicals.

Table 8

Estimates of Production of Chemicals from Coking of Bituminous Coal in Rumania a/
Selected Years, 1948-56

Metric Tons

Product	1948	1951	1952	1953	1954	1955	1956
Metallurgical Coke	50,000	75,000	85,000	135,000	235,000	385,000	575,000
Crude Coal Tar	1,900	2,850	3,250	5,150	10,100	16,500	24,750
Refined Benzol b/	520	775	875	1,400	1,900	3,150	5,900
Toluene b/	80	110	125	200	465	760	1,150
Xylenes b/	Negligible	Negligible	Negligible	Negligible	170	275	410
Naphthalene b/	150	220	255	410	425	700	1,035
Phenol b/	15	22	25	40	90	140	220
Cresols b/	15	35	40	60	140	230	345
Ammonium Sulfate	610	915	1,040	1,650	3,100	5,050	7,550

a. The estimated production for the years 1951-56 is a "logical maximum" based on yield factors, contained in Appendix D, applied to estimated coke production. The actual recovery of each chemical enumerated above is governed not only by the composition of the coal tar but also by relative demand for various coal-tar components and by capacities of purification plants.
b. Considered as an end product in estimates of production of coal chemicals.

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APPENDIX B

COKING AND TAR DISTILLING PLANTS IN THE SOUTH EUROPEAN SATELLITES

I. Coal Coking Plants in Hungary.

A. Obuda Gasworks.

1. Full Name. Municipal Gasworks.

2. Location. Budapest (northwest section of the city).

3. Coordinates. 47°35' N - 19°05' E.

4. Estimated Annual Capacity (Metric Tons).*

Gashouse Coke		Coal Tar	
1938	215,000	1938	7,000
1949	160,000	1949	8,000
1950	215,000 59/	1950	11,000
1953	245,000 60/	1953	13,000

5. Estimated Annual Production (Metric Tons).

Gashouse Coke		Coal Tar	
1938	215,000	Pre-1948	None
1947	150,000	1948	7,800
1950	200,000	1950	10,400
1954	245,000	1954	12,300

* Capacity is used to mean designed optimum production rate at the end of the year cited.

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6. Process. This operation typifies the high-temperature carbonization operations designed to yield a fuel gas for domestic consumption in the city of Budapest. The coal tar produced since 1950 has been processed in a pipe-still system constructed at the gasworks after World War II. This equipment is satisfactory for the coal tar produced from the carbonizing of bituminous coal, but difficulties are encountered in distilling acidic coal tar from domestic brown coal. Only a small amount of light oil fraction is produced at this still. 61/

7. Comments. The announced expansion of the Obuda Gasworks is consistent with increasing needs of the growing Budapest population 62/; the primary purpose of this plant is to supply the city with fuel gas. The Hungarians, nevertheless, are recovering any of the useful chemicals residing in the coal tar, such as naphthalene. It is apparent that coal tar from indigenous brown coal is also to be processed at Obuda but with accompanying technical complications since the still is designed for ordinary coal tar. Bituminous coal from Poland is reported as having been supplied to Obuda at the rate of 40 carloads (approximately 400 tons) daily in April 1949. 63/ A published article discussing the proper storage of Pecs-Komlo coal for high-temperature coking leads to the inference that the Obuda plant is using coal from the Pecs-Komlo mines in addition to imported coal. 64/ It is believed that if that is the case, this domestic coal is being blended with coal imported from Poland to stretch out the stocks of imported coal.

B. Dorog Distillery.

1. Full Name. Magyar Allami Szenbanyak Rt. Szenlepasolo Telepe. 65/

2. Location. Dorog.

3. Coordinates. 47°43' N - 18°44' E.

4. Estimated Annual Capacity (Metric Tons).

Lignite Tar		Tar Acids	
1942	4,000 66/	1942	100
1950	6,000	1949	200

5. Estimated Annual Production (Metric Tons).

Lignite Tar		Tar Acids	
1942	3,500	1942	100
1948	2,100	1948	60
1949	3,000	1950	160 67/
1950	4,800	1954	195
1954	5,900	1956	200
1956	6,000		

6. Process. This is the only other operative soft-coal tar processing plant besides Obuda at the present time. Its equipment includes a continuous, kettle-type still specially adapted to processing domestic tar acids recovered from soft coals. In the horizontal cylinder of this gas-fired kettle, coal tar is steam distilled and is subsequently fractionated in a bubble-cap column according to the boiling points of the various components of the coal tar fraction. From this acidic coal tar is produced phenol, ortho-cresol, meta-cresol, and para-cresol mixture, and cresylic acid, each of 80 to 85 percent purity. Phenol separation is carried on by the alkali process. This low purity is no longer satisfactory for many uses. The Hungarians therefore are believed to have installed a vacuum still in 1952 to increase the purity and the yield of acids from the tar. 68/ Dorog is reported to have a briquetting plant also. 69/ This plant would logically make use of the heavier components of the coal tar, such as pitch.

7. Comments. The facilities of Dorog provide the means of processing the coal tar from the three small plants at Csepel Island, Diosgyor, and Ozd. The light fraction (coal tar) from the operation of the primitive kettle stills at Diosgyor and Ozd are refined at Dorog, as the facilities at Diosgyor and Ozd cannot give a sharp separation of components.

Until 1949 the Rakosi Works on Csepel Island burned the coal tar as a fuel rather than ship it to Dorog for refining. Csepel has an intermittent steam kettle but no fractionating column. Tar which is not burned can be shipped to Dorog for sharp separation and refining. 70/ It is thought that most of the output of tar is currently forwarded to Dorog.

C. Pecs Coking Plant.

1. Full Name. Tar and Synthetic Benzene Works Pecsi Koksmunek. 71/

2. Location. Mecsekszabolcs (northeast of Pecs).

3. Coordinates. 46°08' N - 18°16' E.

4. Estimated Annual Capacity (Metric Tons).

Metallurgical Coke		Coal Tar	
1938	62,000 72/	1938	None
1940	62,000	1940	3,000 73/
1948	62,000 74/	1948	3,000
1952	100,000 75/	1952	4,500

5. Estimated Annual Production (Metric Tons).

Metallurgical Coke		Coal Tar	
1938	53,100 76/	1938	None
1940	50,000	1940	2,500
1948	62,000	1948	3,000
1952	88,000	1952	4,000
1953	100,000	1953	4,500
1956	100,000	1956	4,500

6. Process. The equipment installed here in 1939 was for the recovery of the byproducts of a high-temperature coking operation and for the subsequent distillation of the light oil and coal tar fractions into commercially useful chemicals. 77/ This enterprise is reported as having 36 coke ovens, a tar distillation section, and the Pecs Gas Company (gas plant) as of 1952. 78/ The operation here, as far as can be determined, is designed for the production of metallurgical coke and for the recovery of coal tar.

7. Comments. This installation was believed damaged during World War II. The prewar capacity was reported restored by 1948. 79/ Beyond that restoration, only a limited expansion at this site is anticipated, in view of the two major installations created since the war. The Pecs plant is supplied from mines of the area which produce a bituminous coal, largely small grained. Egg-shaped and brick-shaped briquettes are produced from the smallest grained coal. The medium-sized coal goes toward the coking ovens and consequently into blast furnace use. 80/ The Komlo mines, which produce a coal of quality like that of Pecs, are also reported as supplying the Pecs coking plant. 81/

D. Sztalinvaros Combine.

1. Full Name. Stalin Danube Metallurgical Kombinat.

2. Location. Sztalinvaros (formerly Dunapentele).

3. Coordinates. 46°38' N - 18°55' E.

4. Estimated Annual Capacity (Metric Tons).

Metallurgical Coke		Coal Tar	
1952	None	1952	None
1953	525,000 82/	1953	26,000

5. Estimated Annual Production (Metric Tons).

Metallurgical Coke		Coal Tar	
1953	Negligible	1953	Negligible
1954	400,000	1954	16,000
1955	500,000	1955	23,400
1956	525,000	1956	24,600

6. Process. The primary function of the coking plant at this installation is to supply the Siemens-Martin blast furnace constructed here. 83/ It is then obvious that a metallurgical-grade coke will be the type produced. About 72 percent of the coal will come from the mines of Komlo and Pecs. 84/ The balance will probably be imported from Czechoslovakia or Poland to blend with low-quality bituminous coal of the Pecs-Komlo area. 85/ The installation contains 2 batteries of coke ovens, each battery consisting of 55 chambers. 86/ The second battery was reported by the press to be under construction in September 1953. Another report indicates there will be a complete byproduct recovery plant which will process and refine the usual range of coal chemicals. 87/ This has been confirmed in the press. 88/

7. Comments. Though press claims are to the effect that the coking plant will be supplied principally by Komlo coal, a reliable observer believes that the problem of preparing Komlo and Pecs coal has not yet been solved on a large scale. 89/ In addition to the problem of adapting pilot plant successes is another complication of realizing sufficient production at Komlo to keep the ovens operating at capacity. This poses a major problem of mine expansion, which has been conceded by the Hungarian press to be a formidable undertaking. 90/ It is also reported that the coking ovens would begin operation on Polish coal early in 1954, as Komlo coal was not available at that time. 91/ An additional report claims that Sztalinvaros will receive coke from West Germany within the near future. 92/ The last two reports are plausible in view of the admitted difficulties in making the coking plant fully operative on domestic coal. The very latest information, yet unconfirmed, claims that "putting the big furnace on blast has been postponed to an indefinite date." 93/ If this is true, it probably results from inability to supply the ovens with enough blended domestic coal of a quality to produce metallurgical coke. By the same token, importation of coke and inactivity of the coking ovens will nullify any domestic production of coal chemicals from this plant.

E. Borsod County Chemical Works.

1. Full Name. Sajomenti Vegyimüvek. 94/

2. Location. Kazincbarcika (formerly Sajokazinc).

3. Coordinates. 48°15' N - 20°38' E.

4. Estimated Annual Capacity (Metric Tons).

Metallurgical Coke from Lignite		Coal Tar	
1953	None	1953	None
1954	Unknown	1954	Unknown

5. Estimated Annual Production (Metric Tons).

Metallurgical Coke from Lignite		Coal Tar	
1954	Unknown	1954	Unknown

6. Process. It is believed on the basis of information concerning experiments in relation to Kazincbarcika that the production of coke from brown coal, using the methods and equipment designs of the firm of Didier-Werke A.G., Berlin, is planned. This firm has worked out a method for making metallurgical-grade coke from lignite or brown coal which was successfully tested in a blast-furnace run at Vores, Yugoslavia, in August 1939. 95/ Further light on the state of the technology in Hungary is shed by a report of an exchange of information between East Germany and Hungary during 1952. The information about East Germans concerned their soliciting data on the Hungarian process for making blast-furnace coke from Hungarian lignite in return for some technical data on a German process for coking brown coal. 96/ A Hungarian engineer announced to a trade delegation that the process had been perfected as of early 1954. 97/ The foregoing leads to the conclusion that sometime during 1954 Hungary may produce coke from Borsod brown coal on a commercial scale. There is as yet no information as to coal-tar yields from this process. An analysis of the coal tar indicated it was of high acidic content, and it probably forms an intermediate between the tar of low-temperature distillation and that of coal coking. 98/ It is thought that when Kazincbarcika becomes operative, its production of coal tar will contribute significantly to the domestic coal-tar output of Hungary.

7. Comments. The huge combine being constructed at this site is to make use of the brown coal and lignite deposits of the Borsod region in the coking plant for metallurgical coke production, according to declarations in the Hungarian press. 99/ Other reports confirm that these deposits will be the coal source for the enterprise. 100/ The major uncertainty about the raw material is the quality of it. Conflicting statements indicate it could be either brown coal or lignite, but it is thought that the weight of reporting indicates that the coal is predominantly brown coal. The Five Year Plan calls for the production of coke by means of briquetting and high-temperature distillation, mainly from coals of low tar content mined in the Borsod area. 101/ This latter aim clearly indicates the purpose of the coking plant at Kazincbarcika.

II. Coal Coking Plants in Rumania.

A. Recita Iron Works.

1. Full Name. Sovrometal Iron and Steel Works.

2. Location. Recita.

3. Coordinates. 45°18' N - 21°54' E.

4. Estimated Annual Capacity (Metric Tons).

Metallurgical Coke		Coal Tar	
1952	85,000	1952	3,200

5. Estimated Annual Production (Metric Tons).

Metallurgical Coke		Coal Tar	
1945	37,000	1945	1,400
1950	70,000	1950	2,700
1952	85,000	1952	3,200
1953	85,000	1953	3,200
1956	85,000	1956	3,200

6. Process. The coking operation at Recita is designed primarily to produce a metallurgical-grade coke for the blast furnaces. There are facilities for byproduct recovery and processing to yield the various coke chemicals.

7. Comments. Until 1953, this installation was the sole coking plant engaged in byproduct recovery while producing metallurgical coke. Prewar capacity at Recita is well established. 102/ It is presumed that by 1952 this plant reached capacity production of metallurgical coke and byproducts and will maintain it indefinitely. The amount of coal produced at the nearby Secul mines was insufficient for supplying the needs of Recita, so imports of coal to operate the coking plant at near capacity have long been the practice. 103/ There have been no reports as to the rates of production of the various coke chemicals at Recita, but estimates were made by an indirect process described in Appendix C. In view of the construction of the new iron and steel works at Hunedoara, no further expansion of the Recita Works is anticipated. It is thought that Recita will continue to supply coke to its own blast furnaces. Deficits in production of coke will be supplemented by imports, as in the past, or by shipments from Hunedoara when that installation attains a coke production which it cannot use fully in its own furnaces.

B. Comanesti Coal Distillery.

1. Full Name. "Creditul Carbonifer" S.A. Miniera.

2. Location. Comanesti.

3. Coordinates. 44°56' N - 22°52' E.

4. Estimated Annual Capacity (Metric Tons).

Coke Briquettes		Coal Tar	
1943	60,000	1943	Unknown
1954	N.A.	1954	N.A.

5. Process. The coking operation here produces a coke suitable for briquetting with the coal tar also produced from the lignite basin surrounding it.

6. Comments. A coal distillery was known to exist here prior to World War II. From the 200,000 tons of coal mined in this basin, some 60,000 tons of briquettes were reported produced prior to the war. 104/ There have been no postwar reports concerning the operation of this plant, but it is assumed to use its coal tar solely for the briquetting plant.

C. Petrila-Petroseni Coke Plant.

1. Full Name. "Petroseni" S.A.R. pentru Exploatasea Minelor de Carbuni.

2. Location. Petrila (northeast of Petroseni).

3. Coordinates. 45°26' N - 23°27' E.

4. Estimated Annual Capacity (Metric Tons).

Char		Coal Tar	
1940	20,000	1940	Unknown

5. Process. This site has a low-temperature carbonization plant and also a briquetting plant.

6. Comments. This plant is located within the Jiu Valley mining area, which yields brown coal. It is logical that these mines supply the coking plant which produces a char apparently suitable only for briquetting. Whatever coal tar may be produced is most likely used in this operation. A recent report claimed the production of the whole range of coke chemicals at the Petrila Works as of March 1952. 105/ This seems unlikely in view of the type of coal available and the fact that there is no knowledge of any process being used by the Rumanians for the production of coal chemicals from brown coal. This has been claimed recently by the Hungarians, but until there is confirmation of this inconsistent report, Petrila will not be counted as a domestic producer of coal chemicals.

D. Hunedoara Iron and Steel Works.

1. Full Name. Hunedoara Gh. Gheorghiu-Dej Iron and Steel Combinat.

2. Location. Hunedoara.

3. Coordinates. 45°46' N - 22°53' E.

4. Estimated Annual Capacity (Metric Tons).

Metallurgical Coke		Coal Tar	
1952	None	1952	None
1953	50,000	1953	1,900
1956	490,000	1956	21,500
1957	600,000	1957	24,800

5. Estimated Annual Production (Metric Tons).

Metallurgical Coke		Coal Tar	
1952	None	1952	None
1953	50,000	1953	1,900
1956	490,000	1956	21,500
1957	500,000	1957	22,000

6. Process. Because the operation at Hunedoara is to supply the blast furnaces, it is certain that a metallurgical-grade coke will be produced. Coal-chemical production at this site has also been announced, and byproduct recovery facilities are assumed to exist. The standard range of coke chemicals is considered to be produced at this new site.

7. Comments. This plant represents the first major addition to the domestic production of coke chemicals since the operation of Recita began. Press claims are to the effect that it will be the largest coke plant in Southeast Europe, and these claims will be substantial if the announced capacity of 600,000 tons of coke is

attained. This will constitute an eightfold increase in domestic production of coke and coal chemicals over the maximum production at Recita. 106/ Construction of this installation began in the spring of 1951, 107/ but there was probably no domestic production until the latter part of 1953.

Though Hunedoara is only 75 kilometers away from the brown-coal mines of the Jiu Valley, it is thought that the quality of coal required to produce metallurgical coke will preclude the use of these mines as the source of raw material. It is most probable that Rumania will rely on imports of a cokeable coal from the Soviet Bloc countries, probably Poland and the USSR. Production of the usual variety of coal chemicals will hinge on the Rumanian success in acquiring the necessary bituminous coal for the ovens. It is believed that the USSR has been a major supplier of coal over the past few years; the USSR has been exporting sizable tonnages of coal and coke to Bloc countries since 1950. 108/

APPENDIX C

METHODOLOGY

The estimates for the domestic production of the several coal chemicals reported on here are based on studies of the coking plants within the South European Satellites. Because of the dearth of any actual production statistics on these chemicals, the estimates must be made by the indirect process of determining the production of the various types of coke and tar produced at these plants plus knowledge as to the quality of the byproduct fractions produced.

The assumptions or determinations necessary to arrive at estimates of production of byproduct chemicals include: (1) the quality of the coal supplied to the ovens (usually based on coal source); (2) the existence of byproduct recovery facilities and coal-tar processing equipment comparable to that of other Soviet Bloc countries for which technical aspects are known; and (3) that refining practices are followed which yield the various components of the light oil and coal tar in commercially useful form.

To implement the last two assumptions, yield factors were applied to the estimates of coke or coal tar production. These factors were chosen after a study of comprehensive data on byproduct yields in US coking plants. They were modified where possible by specific information on the yields from the coking plants of European countries which may have influenced the design of the plants in the Balkan countries.

In the rare instance where detailed information on composition of the coal tar was known, this was incorporated into yield factors in arriving at estimates of chemical production.

In view of the demonstrated variations in the output of these products at just one plant, these estimates must not be construed as statistical data on projected goals. Changes in the consumption pattern within each country and the ways in which they will alter the emphasis on the production of any one chemical to the detriment of the production of the others cannot be predicted with any precision.

APPENDIX D

GAPS IN INTELLIGENCE

I. Domestic Production.

A. Hungary.

Despite, or perhaps as a consequence of, the strategic importance of coal chemicals as starting materials for such important military requirements as explosives, production figures are rarely made public in any useful form. Reliable information on the operations of the coking plants and their recovery equipment has been sparse. Details on the technology of the processing and refining operations have been unreported and must be predicted by analogy to industries of countries which have published such information. Information on the yields of coal tar and its derivatives at plants coking brown coal would be of particular value in estimating production from this coal source.

B. Rumania.

There is very limited information on the byproduct yields at the two known producing coking plants in Rumania. The extent to which the byproduct fractions are separated and refined has been unreported. It is certain that strategic commodities such as nitration-grade toluene and benzol must be processed to some degree. Information on the yields from the equipment and coal used at any particular site could be used for projecting estimates into future years -- at least until a change was made in the coal quality or there was substantial modification of the processing equipment.

II. Trade.

A. Hungary.

Fragmentary information on imports and exports indicates that in Hungary shipments of these chemicals are virtually one way. Knowledge that the country is deficient in many of these products is confirmed by scattered reporting of imports, but the extent of dependence on these imports, which is probably great, cannot be determined.

B. Rumania.

Rumania's requirements for purified coal-tar products and the chemicals derived from them are believed to be met largely by importation. The woeful lack of information on this phase of supply makes confirmation of these estimates impossible. The extent of dependence on these imports is also indeterminate until appreciably more information either on actual transactions or on the actual consumption of these products is received.

C. Albania and Bulgaria.

There is almost no information on imports into Bulgaria and none on imports into Albania. It is certain that all domestic requirements are met by imports, but the extent of this supply is unknown.

III. Stockpiles.

A. Hungary.

Information on Hungary's reserves of coal chemicals in their natural state is not available. With the exception of stockpiling in the form of explosives, there are no reserves reported as being maintained in these commodities. Storage of such products, if production and imports combined exceeded consumption, would be possible but unlikely. A more logical practice would be to stockpile several of the key derivatives of the basic chemicals. Information on this aspect of the industry would be useful in pointing up what the Hungarians consider to be the critical products in the event of stoppages in production or loss of import sources.

B. Rumania.

The deficiencies of information on stockpiling which are true of Hungary apply also to Rumania. There are no indications of stockpiling of explosives in Rumania as there have been in Hungary. The same information desired on Hungarian stockpiling is equally desirable on Rumania's stockpiling.

C. Albania and Bulgaria.

There is no information whatsoever on stockpiling in either Albania or Bulgaria.

IV. Consumption.

Information on consumption of coal chemicals varies from fragmentary on Hungary and Rumania to none on Albania. Generally, any reporting on the distribution of the products of the refining facilities to certain other consuming plants aids in determining the end uses of coal chemicals. Because of the relative difference in the stages of development of the coal chemical industries in the US and the South European Satellites, analogy is not applicable.

APPENDIX E

SOURCES AND EVALUATION OF SOURCES

I. Evaluation of Sources.

A. Hungary.

The most useful individual source material available on the status of the Hungarian industry was CIA FDD, Report U-2428, Utilization of Domestic Tar. This translation was made from a series of reports by the Conference of the Veszprem Group of the Hungarian Chemical Society on the "Problems of Our Domestic Tar Processing," which originally appeared in Magyar Kemikusok Lapja (Journal of the Hungarian Chemical Society), No. 4, April 1951. This publication contains the most comprehensive description of the coal-tar industry available, giving an insight into the current state of technology and equipment and indicating prospects for the immediate future.

B. Rumania.

The most useful document available on the Rumanian industry is the Basic Handbook for Rumania, Economic Survey, dated November 1943, a British publication. This document gave vital basic intelligence on the coal resources, coke requirements, and all pre-World War II plant sites.

The dearth of documentary information since the war has magnified the importance of this source as a yardstick in analyzing and integrating the many fragmentary reports received since 1949.

II. Sources.

Evaluations, following the classification entry and designated "Eval.," have the following significance:

Source of Information	Information
Doc. - Documentary	1 - Confirmed by other sources
A - Completely reliable	2 - Probably true
B - Usually reliable	3 - Possibly true
C - Fairly reliable	4 - Doubtful
D - Not usually reliable	5 - Probably false
E - Not reliable	6 - Cannot be judged
F - Cannot be judged	

"Documentary" refers to original documents of foreign governments and organizations; copies or translations of such documents by a staff officer; or information extracted from such documents by a staff officer, all of which may carry the field evaluation "Documentary."

Evaluations not otherwise designated are those appearing on the cited document; those designated "RR" are by the author of this report. No "RR" evaluation is given when the author agrees with the evaluation on the cited document.

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